societal perspective. Replacing IIV3 with IIV4 would result a net societal budget impact of over C$3 million. The ICER of IIV4 vs IIV3 is C$20,733 per QALY gained from healthcare perspective and societally C$16,232 per QALY gained. At $50,000 per QALY gained threshold, 100% and 93.8% of PSA simulations were cost-effective for HD and IIV4, respectively, from healthcare perspective, and 95.3% for IIV4 from societal perspective. HD becomes a dominant alternative when long-term care costs are considered. **CONCLUSIONS:** Both HD and IIV4 are expected to reduce influenza-associated morbidity and mortality, and are cost-effective in the studied population comparing to IIV3; however, IIV4 is extended dominated by HD. Those conclusions were proven to be robust in sensitivity analyses.

PIN35

COMPARATIVE ANALYSIS OF HIV ANTIRETROVIRAL DRUGS APPROVALS AND PRICES IN THE US AND SAUDI ARABIA

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OBJECTIVES: Access to effective, low cost antiretrovirals (ARVs) is a public health imperative. This study compared ARV approvals and prices in Saudi Arabia (SA) and the United States (US) in 2014. **METHODS:** US Food and Drug Administration (FDA) ARV drug approvals data were collected from the FDA website. Likewise, ARV drug approvals and prices in SA were collected from the Saudi Food and Drug Administration (SFDA) website. ARV drug prices data were also collected from the World Health Organization (WHO) website. Descriptive analysis and paired t-test were performed. Statistical significance was set up at 0.05% **RESULTS:** In 2014, there were 27 ARVs and 9 fixed-dose combinations of ARVs approved by the FDA. The WHO listed 22 ARV single active ingredients and 16 combinations. Overall, 29.6% of the single active ingredients and 33.3% of the combinations approved by the FDA were marketed in SA. The FDA approved generic ARVs for 18.5% of the single active ingredients and for 22.2% of the combinations. The WHO listed generic ARVs for 31.8% of the single active ingredients and 100% of the combination drugs. No generic ARV drugs were approved by the SFDA. Price data were available for 13 drugs. ARV drug prices in SA were in median 21.14 times higher than the ARV drug prices listed by the WHO (range 2.2 - 99.8 times) (p<0.0001). **CONCLUSIONS:** Less than one third of the ARV drugs approved by the US FDA were marketed in SA in 2014. Prices in SA were significantly higher than prices listed by the WHO. Lack of SFDA approved generic ARVs may explain the price difference. Approvals of low cost generic ARVs remains a public health priority in SA to improve quality of life of HIV patients in the country.

PIN37

ECONOMIC ASPECTS OF INFLUENZA VACCINATION IN UKRAINE

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OBJECTIVES: To evaluate the cost of influenza vaccination, the sources of financing, and drug cost compared to the cost of vaccination in Ukraine. **METHODS:** We used the statistic data of the MoH of Ukraine, data about the rate of influenza vaccination. Comparative analysis of retrospective data on consumption of drugs and the cost of influenza vaccine. **RESULTS:** Vaccination against influenza and other acute respiratory infections (ARI) are not included in the list of obligatory vaccinations and not funded by the state, partially it funded from local budgets in Ukraine. During 2009-2010 flu had pandemic status, but the number of vaccinated people was minimal. It has been vaccinated 239104 people, among them the expense of businesses - 94546 (39.5%), local budgets - 106498 (44.5%) and patient funds - 38060 (15.9%). Only 2.18% people over 60 years were vaccinated, but this category represents 15.9% of the total population. We conducted that average cost of flu vaccination was 101,0 UAH (1 USD = 16,5 UAH). The average cost of ambulatory treatment per patient was 241,1 UAH, it was 2,4 times more than the vaccination cost Analysis of sales of drugs used for treatment of flu and ARI showed: NSAIDS were spent 118,8 mln. UAH., Expectorants - 275,3 mln., Antibiotics – 218,1 mln., but the cost of vaccines were 23,2 mln. UAH. The comparison showed that the cost of drugs for the treatment of influenza and ARI were at 26.4 times more than vaccines. **CONCLUSIONS:** We evaluated the high rate of incidence of influenza, low rate of influenza vaccination in 2009, a low percentage of vaccination of health-risk groups (for example, 60 +), the high cost on drugs to treat the flu and ARI. It confirmed the economic expediency of using influenza vaccine in Ukraine.

PIN38

COST-UTILITY ANALYSIS OF INFLUENZA VACCINES FROM SOCIETAL PERSPECTIVE: A COMPARISON OF THE HUMAN CAPITAL APPROACH AND FRICTION COSTS APPROACH IN THE VALUATION OF PRODUCTIVITY COSTS AMONG SENIORS IN ONTARIO CANADA

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OBJECTIVES: Although employment rate is lower in the elderly population, different methods valuing productivity loss can yield contrasting incremental cost-effectiveness ratios (ICER). This research aims to compare the impact of human capital (HC) and friction cost (FC) methods on productivity costs and incremental cost-effectiveness ratios (ICERs) of replacing IIV3 with either high dose (HD) or quadrivalent (IIV4) among adults aged 65 and over in Ontario. **METHODS:** Population-level influenza outcomes from either Ontario or Canada with provincial wage data set were used to calculate the productivity loss due to physician visits, ED visits, hospitalizations and premature deaths. Vaccines efficacies were extracted from clinical studies and published literatures. HC and FC utilized discounted life expectancy and 90-day friction period, respectively. Alternative friction periods and elasticity factors were analyzed. **RESULTS:** With IIV3 under the current Universal Influenza Immunization Program (UIIP), the productivity costs due to influenza-related premature mortality is C$11.92/person and C$0.86/person with HC and FC approach, respectively. Those per person for HD in place of IIV3 would be C$9.13 (HC) and C$0.65 (FC); for IIV4, the comparable estimates would be C$11.65/person (HC) and C$0.84/person (FC). ICER of HD vs IIV3 was C$190/QALY with HC approach and C$3,106/QALY with FC. In comparison, the difference of ICERs of IIV4 vs IIV3 was small - $16,232/QALY (HC) and C$19,028/QALY (FC). Exclusion of productivity costs of mortality had minimal impact with similar ICERs to FC method. **CONCLUSIONS:** The differences in ICERs of IIV4 vs IIV3 with HC method, FC method or no productivity costs of mortality were significantly narrower than those of HD vs IIV3. Relative vaccine efficacy against influenza-related deaths to IIV3 was a key driver of productivity costs; therefore, choice of methods could be crucial with massively different results. Those conclusions were robust to alternative friction periods and elastic factors.

PIN39

BURDEN OF DISEASE AND ECONOMIC IMPACT OF MALARIA IN COLOMBIA, 2012

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OBJECTIVES: Colombia is an endemic country for malaria. Burden of disease and costs estimations are scarce. The aim of this analysis is to estimate the burden of disease and the diagnosis and care costs of malaria, from the surveillance data. **METHODS:** A malaria transmission model was built from an age-dependent Markov process, to simulate the morbidity and mortality of the malaria infection in the Colombian population from the national surveillance system and other literature. The model included a birth cohort followed up to their life expectancy. We estimated the number of malaria, malaria complicates and death cases in the cohort during the life span. From the official malaria diagnosis and treatment guidelines we captured the frequency of use for all cost items and calculated the cost per patient from the tariff manual and international prices. Cost estimation was carried out from the third payer perspective. We estimated the disability adjusted life years (DALYs) and diagnosis and care costs for each malaria case and entire population during 2012 splitting by different Plasmodium specie. All costs were reported in 2012 American dollars (exchange rate of US$ 1768.23. per COP). **RESULTS:** During 2012 we estimated 65.448 cases and 32 deaths due to malaria. The 71.7% of cases were due to P. vivax and 27.0% by P. falciparum. Complications were presented in 1% of all cases. All malaria cases sum a burden of disease of 1902 DALYs (mainly due to year of life lost-YLL, 1878). Total estimated cost was US$936.253, 5% of them due to complicated malaria. **CONCLUSIONS:** Burden and costs of disease due to malaria in Colombia are relevant in spite of availability of effective preventive measurements. Cost-effectiveness of different public health interventions should be evaluate for the decision making process and this model will be a valuable input for that task.

PIN40

IMPACT OF SURGICAL SITE INFECTIONS FOLLOWING COMMON AMBULATORY PROCEDURES ON HEALTHCARE COSTS

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OBJECTIVES: Data on costs of surgical site infections (SSIs) following ambulatory surgery are sparse, despite a shift towards outpatient procedures. We determined the impact of serious and non-serious SSIs on healthcare costs following common ambulatory surgical procedures throughout the cost distribution. **METHODS:** We conducted a retrospective cohort study of persons < 65 years coded for cholecystectomy, breast-conserving surgery (BSC), anterior cruciate ligament reconstruction (ACL), or hernia repair from 12/31/2004–12/31/2010 using commercial insurer claims data. SSIs within 90 days after surgery were identified by ICD-9-CM diagnosis codes. Infections during inpatient hospitalization or resulting in surgical treatment were considered serious. Quantile regression controlling for underlying illness, operative variables, demographics, and surgical facility type was used to examine the impact of serious and non-serious SSIs on 180-day healthcare costs. RESULTS: The incidence of serious/non-serious SSIs (# procedures) were 0.8%/0.2% after ACL (21,062), 0.5%/0.3% after cholecystectomy (57,750), 0.6%/0.5% after hernia repair (60,681), and 0.8%/0.8% after BCS (42,489). Serious SSIs were associated with significantly higher costs than non-serious SSIs for ACL, cholecystectomy, and hernia repair at all points examined in the cost distribution. For BCS, serious SSIs were associated with significantly higher costs at the upper end (>=80th percentile) of the cost distribution. The ratio of adjusted total costs for individuals with serious SSI vs. no SSI increased for both cholecystectomy and hernia repair as the total cost increased (3.2 for cholecystectomy with serious SSI/no SSI at the 70th percentile of costs, up to 4.9 at the 95thpercentile). **CONCLUSIONS:** SSIs, particularly serious infections resulting in hospitalization or surgical treatment, were associated with significantly increased healthcare costs after 4 common surgical procedures performed in inpatient and ambulatory settings. Quantile regression illustrated the impact of serious SSIs on healthcare costs across the distribution of costs, especially at the upper end of the cost distribution.

PIN41

RECENT TRENDS IN URGENT ANTIBACTERIAL THREAT-RELATED HOSPITALIZATION IN THE US

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OBJECTIVES: Antibiotic resistance (ABR) poses a threat to public health in the United States (US). The Centers for Disease Control and Prevention has identified three ABR urgent threats (defined as potential clinical and economic impact, transmissibility, available treatment, barriers to prevention): Clostridium difficile (C. diff), carbapenem-resistent Enterobacteriaceae (CRE), and Neisseria gonorrhoeae (N. gonorrhoeae). Limited data exist which document ABR-related burden in the context of inpatient care. This study examines length of stay (LOS) and costs associated with ABR urgent threat-related hospitalizations in the US. **METHODS:** Using the 2001-2012 Healthcare Cost and Utilization Project's Nationwide Inpatient Sample databases, nationally-representative surveys of US hospitalizations, we identified hospitalizations with a diagnosis code indicating an urgent ABR threat. LOS and

total costs (in 2014 US dollars) were estimated for each urgent ABR threat, for each year analyzed. **RESULTS:** The number of CRE- and C. diff-related hospitalizations increased during the study period (CRE: 109,304 in 2001 to 692,680 in 2012; C. diff: 144,312 in 2001 to 359,395 in 2012) but decreased for N. gonorrhoeae (5,440 in 2001 to 4,130 in 2012). The mean LOS for all hospitalizations in the US between 2001-2012 was 4.58 days and mean per-patient cost of $16,168. LOS for all urgent threats decreased over time (LOS: N. gonorrhoeae, 2001: 4.05 days, 2012: 3.92 days; CRE, 2001: 10.15 days, 2012: 6.98 days; and C. diff, 2001: 13.53 days, 2012: 10.41 days) while total costs increased for N. gonorrhoeae, (2001: $9,963, 2012: $14,675) and C. diff(2001: $36,896, 2012: $43,632) but not for CRE (2001: $27,356, 2012: $26,959). **CONCLUSIONS:** Although LOS among ABR-related hospitalizations in the US has decreased over time, costs for both N. gonorrhoeae and C. diff have increased, +47% and +18%, respectively. Future efforts to reduce the incidence of ABR infection will improve the public's health as well as decrease the associated economic burden.

PIN42

DIRECT MEDICAL COSTS AND ASSOCIATED FACTORS IN PATIENTS WITH CHRONIC HEPATITIS B IN GUGNGZHOU, CHINA: A FIVE-YEAR RETROSPECTIVE COHORT STUDY

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OBJECTIVES: To describe direct medical costs and factors associated with three disease stages of chronic hepatitis B virus infection (CHB) in Guangzhou, China. **METHODS:** We conducted a retrospective cohort study of patients with CHB using a hospital information system database from 2008 to 2012 in the largest specialized infection hospital in Guangdong Province, China. Average annual costs and cost components were calculated. Generalized estimating equations were applied to explore associations between factors and costs. All costs were adjusted to RMB in 2012 at a discounting rate of 5% per year. **RESULTS:** A total of 65,792 (58 455 outpatients and 7 337 inpatients) were involved in the analysis. Number of visits/admissions (mean) per case per year for outpatient and inpatient were as follows: CHB: 4.56/1.12; Cirrhosis: 4.34/1.24; HCC: 2.46/1.13; and the corresponding average costs per person-time were: CHB: 581.79 and 8994.90 RMB; Cirrhosis: 670.71 and 16574.44 RMB; HCC: 643.69 and 20900.89 RMB, respectively. Antiviral (47.93%) and non-antiviral medicines (34.44%, including 16.99% of liver protectors and 6.31% of traditional Chinese medicine) for outpatient were the main cost components. Inpatient non-antiviral medicine and lab test contributed 45.56% and 23.38% of total costs; but antiviral medicine was only at 6.28% of total costs. Male, elder, antiviral patients, cirrhosis and HCC patients had statistically significant higher costs as compared with female, younger, non-antiviral and CHB patients. Among the outpatients, self-payment patients' costs were the highest, followed by patients with medical insurance and free medical service, whereas opposite effect direction on costs was found in inpatients, and the differences were statistically significant. **CONCLUSIONS:** Direct medical costs of inpatients with CHB increase significantly as the disease progresses. Payment mode has different effect direction between outpatient and inpatient, indicating that reimbursement policy for clinic and hospitalized patients have an important role on direct medical costs in treating HBV.

PIN43

BURDEN AND PREDICTORS OF HOSPITALIZATION COSTS ASSOCIATED WITH ANTI-INFECTIVE ADVERSE EVENTS

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OBJECTIVES: To assess the burden of and identify predictors of hospitalization costs associated with adverse drug events (ADEs) related to anti-infectives that were present on admission (POA) in US hospitals. Furthermore, we sought to identify differences in costs by gender and age groups. **METHODS:** Using the 2012 Nationwide Inpatient Sample, we identified ADEs associated with anti-infectives using diagnosis codes (ICD-9-CM) and E codes. Differences in average and median hospitalization costs between subgroups were assessed using t-tests and Wilcoxon non-parametric median tests. To assess predictors of cost, we developed a generalized linear model (GLM) using the Modified Park test, Box-Cox regression test, Akaike information criterion and residual analysis to improve model fit. Results were weighted to obtain nationally representative cost estimates in 2012 dollars. **RESULTS:** Our study identified 49,623 discharges with POA ADEs (national estimate= 248,095) associated with anti-infectives with a total cost of $2.1 billion (national estimate=$10.6 billion). The mean cost for each hospitalization was $43,499 (SD= $76,865, median= $23,565, interquartile range=$13,189-$45,424) with a range $275 to $2,995,306. The mean length of stay (LOS) was 6.64 days (SD=7.84, median= 5) and ranged from 0 to 354 days. Total hospitalization costs were significantly (p= <.0001) higher for males (4.50%) and those aged 65 years or older (3.34%). GLM with gamma family and log link was a better model compared to ordinary least-squares. Using this model, we identified several significant cost predictors: LOS, age at admission, race, gender, median household income, hospital bed size and numerous comorbidities. Our model estimated that the cost of hospitalization, which was $67,528 for LOS of one day, increased 11.20% with each day increase in LOS. Each year increase in age caused 0.05% increase in hospitalization costs. **CONCLUSIONS:** Our findings suggest that ADEs associated with anti-infectives are more costly when they occur in older patients and among those with medical comorbidities.

PIN44

IMPACT OF DIFFERENT TREATMENT RATES FOR HEPATITIS C INFECTED PATIENTS ON THE EPIDEMIOLOGIC & ECONOMIC BURDEN IN EGYPT

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OBJECTIVES: HCV infection in Egypt is one of the highest in the World. The objective of the study is to support Egyptian decision makers by comparing different treatment rates with the recent approved Hep C antiviral agents, and its implications on prevalence progress and associated costs. **METHODS:** The analysis was based on a 17-year Markov model.Patients would progress through the various HCV stages from F0 to F3 followed by cirrhosis. Following cirrhosis to other progressive stages up to hepatocellular carcinoma and liver related death. Patients could be cured spontaneously in state F0 or as a result of antiviral therapy in any state from F0 to cirrhosis at a cure rate of 92% in stages F0-F3 and a cure rate of 80% in the stage of cirrhosis. Cured patients would transition to the mortality risk of the age-matched general population. In each cycle, new incident patients were also introduced at a rate of approximately 128,000 or 2%. **RESULTS:** Treating 8% of the infected cases each year (450K viremic cases/year) would bring the prevalence to 1 million by 2030. A treatment rate of 1% (65Kcases/yr) or 5% (300Kcases/yr) would bring the prevalence to 5.5 million and 2.5 million respectively by 2030. Total annual costs would start at $1.3Billion in the first year of treatment for the 8% treatment rate but would decrease to $580million/yr by 2030. The 5% and 1% rates would start at $900million & $550million. **CONCLUSIONS:** A treatment rate of 450Kcases/yr would bring the prevalence to 1 million by 2030. Costs would be significantly high during the first 5 years, but eventually would dop as the disease burden decreases. Alternative scenarios wouldn't eliminate the disease by 2030. A screening policy need to be in place & health infrastructure assessed in preparation for the rising numbers of patients receiving treatment

PIN45

ECONOMIC BURDEN OF COMMUNITY-ACQUIRED PNEUMONIA AMONG ADULTS IN THE PHILIPPINES ITS CLINICAL AND POLICY IMPLICATIONS IN THE CASE RATE PAYMENTS OF THE PHILIPPINE HEALTH INSURANCE CORPORATION

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OBJECTIVES: To determine (1) the cost of hospitalization and 1-week post-discharge, (2) the difference between estimated costs and the Philippine Health Insurance Corporation (PhilHealth) pneumonia case rate payments, and (3) the economic burden of community-acquired pneumonia (moderate and high-risk, CAP-MR and CAP-HR, respectively) among patients aged > 19 years old in the Philippines. **METHODS:** The study involved two tertiary private hospitals in the Philippines. Using the societal perspective, out-of-pocket expenses and productivity losses were computed. A base case and sensitivity analyses were performed and the economic burden of pneumonia was determined using Philhealth claims. **RESULTS:** The estimated cost of hospitalization for CAP-MR was PhP 36,153 - 113,633 (US$852 – 2,678) and the1-week post-discharge cost for CAP-MR was PhP 1,450 – 8,800 (US$ 34 – 207) The cost of hospitalization for CAP-HR was PhP 104,544 – 249,695 (US$2,464 – 5,885) and PhP 101,248 – 243, 495 (US$2,386 – 5,739) with the use of either invasive ventilation or non-invasive ventilation, respectively. The post discharge cost for CAP-HR was PhP 1,716 – 10,529 (US$40 – 248). In comparison, the present PhilHealth case rate payments for CAP-MR is PhP 15,000 (US$354) and PhP 32,000 (US$754) for CAP-HR. Based on the number of PhilHealth claims for the year 2012 and the study results, the economic burden of pneumonia in 2012 was PhP 8.48 billion for CAP-MR and PhP 643.76 million for CAP-HR. **CONCLUSIONS:** The paper reported the hospitalization and follow-up costs of CAP-MR and CAP-HR based on the societal perspective. It showed significant difference from the current case rate payments of the Philippine Health Insurance Corporation.

PIN46

COSTS AND CHALLENGES ASSOCIATED WITH DIAGNOSIS AND TREATMENT OF INFECTIONS IN HOSPITALIZED PATIENTS: A RETROSPECTIVE US ELECTRONIC HEALTH DATABASE STUDY

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OBJECTIVES: While it is known that accurate and timely diagnosis and treatment of infections can present a major healthcare challenge, there is a lack of in-depth studies examining infection diagnosis and treatment practices and their associated costs in large real-world patient populations. The study objective was to examine infection prevalence, current diagnosis and treatment practices, and costs associated with managing patients with infections via retrospective analysis of a large US electronic health record database. **METHODS:** Patients with infections were identified based on the use of antimicrobial therapy for >24 h following hospital admission. Infection type was identified using ICD-9 diagnosis coding. Patients were classified into four groups: (1) pneumonia, (2) sepsis without pneumonia, (3) other infectious etiology, and (4) non-infectious etiology initially suspected as infectious. Illness severity was assessed using the Acute Physiology Score. Diagnostic procedures and treatments were identified via ICD-9 procedure coding and pharmacy order data, respectively. Per-patient cost estimates ($USD), calculated over 15 days from admission, encompassed diagnostic tests, radiologic procedures, and antimicrobial and other pharmaceutical treatments. **RESULTS:** In total, 127,174 patient visits met inclusion criteria. Pneumonia was the most common infection type (20.1% of visits), followed by other infectious etiology (16.0%) and sepsis without pneumonia (7.0%). Non-infections initially suspected as infections represented 56.9% of visits. Overall, 62.5% of patients had medium or high illness severity. Length-of-stay was >5 days for 49.2% of patients. Bacterial tests accounted for 92.4% of diagnostic tests, and antibiotics accounted for the majority (>98%) of antimicrobial treatments. Suspected infections with non-infectious etiology had the highest per-patient costs for low-severity ($14,228) and medium-severity patients ($12,551). For high-severity patients, pneumonia carried the highest per-patient cost ($14,541). **CONCLUSIONS:** This study demonstrates that the